REMARKS

Claims 1-5, 7-12 and 14-17 are rejected under 35 USC §102 and Claims 1-17 are rejected under 35 USC §103. The applicants respectfully traverse these rejections and request reconsideration of the application in view of the above amendments and the following remarks.

Claims 1, 5, 7 and 8 have been amended and Claims 6 and 9 have been canceled. These changes do not constitute new matter since this clarification of the claims is supported by the original disclosure.

REJECTIONS UNDER 35 USC §102

Claims 1-5, 7-12 and 14-17 were rejected under 35 USC §102(b) as being anticipated by U.S. Patent no. 4,891,463 to Chu ("Chu"). Specifically, the Office Action suggests that Chu discloses a process of aromatization of a paraffin, such as ethane and propane, to benzene, toluene, C8 aromatics, methane and ethane in the presence of a catalyst containing a ZSM-5 zeolite, the aluminum of which is substituted with gallium, a metal such as platinum, and a binder such as alumina and silica.

Claim 1 has been amended and now reads in part "the catalyst consists essentially of platinum deposited on an aluminosilicate MFI zeolite". Support for this language is found on page 7, lines 7- 8. Claim 5 has been amended and now reads in part "the catalyst is Pt/ZSM-5". Support for this language is found on page 6, lines 10-11, and page 10, Example 1. These changes in language has been made to Claims 1 and 5 to clarify the claimed subject matter.

Chu discloses a ZSM-5 zeolite, the aluminum of which is substituted with gallium. The zeolite of the present invention does not have the aluminum substituted with gallium. The catalyst

composition of the claimed invention, a catalyst consisting essentially of platinum deposited on an aluminosilicate MFI zeolite, e.g., Pt/ZSM-5, is not specifically disclosed in Chu. The law requires identity between the claimed invention and the cited reference which must teach the entirety of the claimed invention [Structural Rubber Products, Co. v. Park Rubber Co., 223 USPQ 1264, 1271 (Fed. Cir. 1984)]. Chu does not teach platinum deposited on an aluminsosilicate MFI zeolite which does not have the aluminum substituted with gallium. The presence of gallium is an essential feature of Chu. Claim 1 now claims subject matter not anticipated by Chu.

REJECTIONS UNDER 35 USC §103

Claims 1-5 and 7-17 were rejected under 35 USC 103(a) as being obvious over Chu and Claim 6 was rejected under 35 USC 103(a) as being obvious over Chu in view of U.S. Patent no. 6,160,191 ("Smith"). Specifically, the Office Action suggests that Chu discloses a process of aromatization of a paraffin, such as ethane and propane, to benzene, toluene, C8 aromatics, methane and ethane in the presence of a catalyst containing a ZSM-5 zeolite, the aluminum of which is substituted with gallium, a metal such as platinum, and a binder such as alumina and silica and Smith discloses an aromatization catalyst of which the silicon can be substituted with germanium.

Claim 6 has been canceled.

Every limitation in the claims must be given effect rather than considering one in isolation from the others [In re Geerdes, 491 F2d 1260, 180 USPQ 789(CCPA 1974)]. The patentable difference of the present invention over the reference is that the catalyst of the claimed invention consists essentially of an aluminosilicate MFI zeolite on which platinum has been deposited. The aluminosilicate MFI zeolite does not contain gallium.

MPEP §2142 requires some suggestion or motivation to modify the reference. Such suggestion or motivation for a catalyst consisting essentially of platinum deposited on an aluminosilicate MFI zeolite (which does not contain gallium) did not exist. Chu, alone or in combination with Smith, does not provide a suggestion or motivation to use a catalyst consisting essentially of platinum deposited on an aluminosilicate MFI zeolite (which does not contain gallium) as a catalyst. MPEP§2142 also requires a reasonable expectation of success. While it may have been obvious-to-try a process for the aromatization of hydrocarbons using a catalyst consisting essentially of platinum deposited on an aluminosilicate MFI zeolite (which does not contain gallium), obvious-to-try is not equivalent to a reasonable expectation of success. Further, according to MPEP§2142, the prior art reference must teach or suggest all the claim limitations. The cited references do not teach or suggest using a catalyst consisting essentially of platinum deposited on an aluminosilicate MFI zeolite (which does not contain gallium) in a process for the aromatization of hydrocarbons.

Even if a prima facie case of obviousness were established by the cited references, the unexpected results of the claimed invention would satisfy the requirements of patentability. If Chu provided the suggestion or motivation to modify the disclosure to use a catalyst of an aluminosilicate MFI zeolite which does not contain gallium, Chu also discloses an added metal which may be deposited on the surface of the zeolite by conventional ion-exchange or impregnation techniques (col. 3, lines 45-49). The added metal may be Groups I through VIII of the Periodic Table, examples of which are zinc, platinum, rhenium, cobalt, titanium, tellurium, sodium, nickel, boron, chromium, vanadium, copper, palladium, calcium, and rare earth metals (col. 3, lines 49-54,

and col. 5, lines 15-20). There is no suggestion or motivation that choosing platinum over the other metals would have an advantage or benefit.

As shown in the Specification on pages 10-13, Example 1, Comparative Examples 1-5 and Table 1, platinum (Example 1), rhenium (Comparative Example 1), gold (Comparative Example 2), ruthenium (Comparative Example 3), zinc (Comparative Example 4) and iron (Comparative Example 5) are deposited on ZSM-5 and each catalyst is used in a process to aromatize propane to aromatics with a fuel gas (predominantly methane and ethane) byproduct. The results for the composition of the fuel gas show that Pt/ZSM-5 yields more ethane than methane (C_2 v. C_1).

Table 1

Example	Metal	Fuel Gas (wt%)	C_1 (wt%)	C_2 (wt%)
1	Pt	72.2	4.8	67.4
Comp. 1	Re	37.5	11.08	26.38
Comp. 2	Au	48.2	19.1	29.1
Comp. 3	Ru	55.2	24.4	30.8
Comp. 4	Zn	45.4	13.8	31.6
Comp. 5	Fe	55.5	14.8	40.6

The Pt loading can affect the selectivity to benzene, toluene and xylene (BTX). As noted in Specification on page 13, line 5, through page 14, line 11, Examples 2-5 and Table 2, Pt loading can be from 0.06 wt% to 0.33 wt% but is from about 0.1 wt % to 0.3 wt% without loss of selectivity to ethane in the fuel gas component and with little impact to conversion and selectivity to BTX. Claims 7 and 8 have been amended and Claim 9 has been canceled to incorporate these Pt loadings and to clarify the claimed subject matter.

The examiner argues that the ratio of ethane and methane in the product is found in Chu at col. 9, lines 29-35, and Tables 1 and 2. The reference has been reviewed closely and, while there is disclosure of decreasing selectivity for methane and ethane, there is no disclosure for producing more ethane relative to methane as claimed in the present invention. From Table 1 of Chu:

Methane wt%	2.74	3.82	5.85	3.82	4.41	4.92	0.01	0.74
Methane mole%	0.17	0.24	0.37	0.24	0.28	0.31	0.0006	0.05
Ethane wt%	4.62	8.24	6.07	9.70	7.50	7.48	4.82	1.56
Ethane mole%	0.15	0.27	0.20	0.32	0.25	0.25	0.1607	0.05
Ethane:Methane Mole Ratio	0.88	1.13	0.54	1.33	.89	.81	267.83333	1.0

From Table 2 of Chu:

Methane wt%	6.31	5.22	4.89	4.84	4.73	8.94	7.67	5.52	8.15
Methane mole%	0.39	0.33	0.31	0.31	0.30	0.56	0.48	0.35	0.51
Ethane wt%	21.44	18.10	15.46	16.91	16.52	22.88	19.63	21.36	14.99
Ethane mole%	0.71	0.60	0.52	0.56	0.55	0.76	0.65	0.71	0.50
Ethane:Methane Mole Ratio	1.82	1.82	1.68	1.81	1.83	1.36	1.35	2.03	0.98

From Table 1 of the present application:

	Methane wt%	Methane mole%	Ethane wt%	Ethane mole%	Ethane:Methane Mole Ratio
Example 1	4.8	0.3	67.4	2.25	7.5
Comp. 1	11.08	0.69	26.38	0.88	1.28
Comp. 2	19.1	1.19	29.1	0.97	0.82
Comp. 3	24.4	1.53	30.8	1.03	0.67
Comp 4	13.8	0.86	31.6	1.05	1.22
Comp. 5	14.8	0.93	40.6	1.35	1.45

From Table 2 of the present application:

	Methane wt%	Methane mole%	Ethane wt%	Ethane mole%	Ethane:Methane Mole Ratio
Example 2	5.2	0.33	39.3	1.31	3.97
Example 3	3.2	0.2	49.7	1.66	8.3
Example 4	3.0	0.19	46.9	1.56	8.21
Example 5	3.3	0.21	31.7	1.06	5.05

As the above data shows, the claimed process produces more ethane relative to methane than the prior art process of Chu. Claim 17 specifies the mole fraction ratio of ethane relative to methane in the range from 2 to 10. With only two exceptions (one with an ethane:methane mole ratio of over 250 which is apparently an anomaly in the data) the ethane:methane mole ratios from Table 1 and Table 2 of Chu are less than 2. The ethane:methane mole ratio of the Examples of the present application are all with the claimed range of 2 to 10.

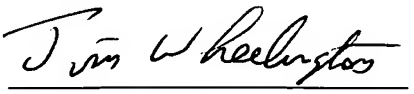
As noted in the Specification, it would be advantageous if methane production could be suppressed in favor of producing more ethane relative to methane from the side reactions of alkane aromatization (page 6, lines 3-5) since the high content of ethane relative to methane allows this process effluent to be a feedstream for a cracker (page 6, line 25, through page 7, line 3). The claimed process for aromatization of alkanes with a catalyst consisting essentially of platinum deposited on an aluminosilicate MFI zeolite has advantages not disclosed by the prior art.

A Petition and Fee for Extension of Time under 37 CFR §1.136(a) and a Request for Continued Examination (RCE) under 37 CFR §1.114 are being filed concurrently with this paper. The Commissioner is hereby authorized to charge the fee of $450.00 under 37 CFR §1.17(a)(2), the

fee of $790.00 under 37 CFR §1.17(e) and any additional fees due by filing this paper or to credit any overpayment to Account No. 502025.

On the basis of the above amendments and remarks, reconsideration of this application is requested and its allowance of the claims is requested at the examiner's earliest convenience. No new matter has been added.

Respectfully submitted,



Jim Wheelington
Reg. No. 33,051

SABIC Americas, Inc.
SABIC Technology Center
1600 Industrial Blvd.
Sugar Land, Texas 77478
(281) 207-5719
Customer No. 30691

LISTING OF CLAIMS IN THE APPLICATION

1 (Currently amended). A process for aromatization of alkanes comprising contacting an alkane having one to four carbon atoms per molecule with a ~~Pt/ZSM-5~~ catalyst under conditions to convert the alkane to benzene, toluene and xylenes and byproducts of methane and ethane wherein the catalyst consists essentially of platinum deposited on an aluminosilicate MFI zeolite.

2 (original). The process of Claim 1 wherein the catalyst has a silicon to aluminum atomic ratio (Si:Al) is greater than 2.

3 (original). The process of Claim 2 wherein the silicon to aluminum atomic ratio is in the range from 10 to 200.

4 (original). The process of Claim 3 wherein the silicon to aluminum atomic ratio is in the range from 20 to 100.

5 (Currently amended). The process of Claim 1 wherein the catalyst ~~contains gallium, boron or beryllium substituted for the aluminum~~is Pt/ZSM-5.

6. Canceled

7 (Currently amended). The process of Claim 1 wherein platinum is present in the range from ~~0.05 to 5%~~ 0.06 wt% to 0.33 wt%.

8. (Currently amended). The process of Claim 1 wherein platinum is present in the range from ~~0.05 to 5%~~ 0.1 wt% to 0.3 wt%.

9. Canceled

10 (original). The process of Claim 1 wherein the catalyst is bound by oxides of magnesium, aluminum, titanium, zirconium, thorium, silicon, boron or mixtures thereof.

11 (original). The process of Claim 1 wherein the catalyst has an amorphous support.

12 (original). The process of Claim 11 wherein the amorphous support is an oxide of aluminum (alumina) or silicon (silica).

13 (original). The process of Claim 1 wherein the chemical formula of the zeolite is represented as:

$$|Pt_{0.0025}H^{+}|[AlSi_{95}O_{192}] - \textbf{MFI}$$

14 (Previously amended). The process of Claim 1 wherein the process is a dehydrocyclodimerization process of a C_3 alkane to benzene, toluene and xylenes.

15 (original). The process of Claim 14 wherein the temperature is in the range of from 350°C to 650°C.

16 (original). The process of Claim 14 wherein the pressure is in the range of from 10 to 2000 kPa gauge.

17 (original). The process of Claim 1 wherein the mole fraction ratio of ethane relative to methane is in the range from 2 to 10.